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Blended VS On-Campus Learning: A Study of Exam Results in the Bachelor Degree in Nursing

Bjørg F. Oftedal, Kristin H. Urstad, Venche Hvidsten and Brynjar Foss
Department of Health Studies
University of Stavanger, Norway

Abstract. Blended learning is a pedagogical method combining classroom learning and online learning. For this purpose, various digital and web-based learning tools have been developed. Although the benefits of blended learning are extensive and valued by many students, there is a growing need to explore how blended learning might affect learning outcomes. The aim of this study was to compare learning outcomes between students receiving blended learning and the conventional, on-campus approach. The study had a descriptive quantitative design. The data was collected from the exam database at the Faculty of Social Sciences. The study included all nursing students enrolled in 2009 and 2010 attending the three-year on-campus program or the four-year blended learning program. Results show that students engaged in blended learning perform at least as well on theoretical exams as the on-campus students. This indicate that students in blended learning are just as capable of doing well in nursing program as students in an on-campus program. Nevertheless, further research should focus on larger sample sizes combined with other methodological approaches in order to explore the impact of blended learning more deeply.

Keywords: Blended learning; Bachelor in nursing; Learning outcome; Quantitative method

Introduction

Blended learning, the systematic integration of traditional classroom learning combined with digital learning solutions, is a relatively new pedagogical method in higher education (Galy, Downey, & Johnson, 2011; Hsu & Hsieh, 2014; Percival & Muirhead, 2009). Blended learning thus causes changes in learning patterns and practices and may represent a paradigm shift in which the emphasis of the academic institution changes from traditional teaching to active learning (Lopez-Perez, Perez-Lopez, & Rodriguez-Ariza, 2011).

Blended learning has become widespread among students because of its potential for providing more flexible and asynchronous learning activities, offering some of the conveniences of campus courses with the complete face-to-face contact (Means, Toyama, Murphy, & Baki, 2013). For this purpose, various digital learning tools have been developed including learning management systems (LMS) (Burgess, 2003; Galy et al., 2011), rich media solutions such as Mediasite (Blevins & Elton, 2009; Harvel & Hardmann, 2012; Vasu & Ozturk, 2008), e-compendiums (Foss, Oftedal, & Løkken, 2013) and podcasts (Delaney, Pennington, & Blankenship, 2010; Evans, 2008; Foss et al., 2013).

Prior studies indicate that blended learning has many positive effects. For example, some authors have reported that blended learning increases students motivation for learning, reflection, and collaboration; reduces dropout rates; and eliminates geographical barriers (Du et al., 2013; Hsu, 2012; Lopez-Perez et al., 2011). In addition, studies reveal that students are more satisfied with blended learning because of the flexibility and accessibility it affords, as well as the opportunity to be more active in the learning process because of various digital learning tools e.g. games (Hsu, 2012; Korhonen & Lammintakanen, 2005; Lim & Morris, 2009; Smyth, Houghton, Cooney, & Casey, 2012; Wu, Tennyson, & Hsia, 2010). Although the promises of blended learning are extensive, some studies have highlighted the negative effects of blended learning. These include technical difficulties, students' feelings of isolation, students becoming overwhelmed, and the feeling that on line tools are too invasive in their everyday lives (Smyth, 2012). Nevertheless, according to a meta-analysis, most research in this area tends to focus on students experiences (Means et al. 2013). Therefore, more research about how the blended learning program affects exam results when compared to ordinary on-campus programs is recommended (Means et al., 2013).

Aim

The aim of this study was to compare learning outcomes between students receiving blended learning and a conventional, on-campus approach. This was performed by comparing students exam results in all the theoretical subjects for the three-year, on-campus bachelor degree in nursing, with students exam results for the four-year, blended learning bachelor degree in nursing.

Study Context

In 2009, a University in Norway initiated a four-year blended learning program for the bachelor degree in nursing. The curricula was introduced as a supplement to the conventional three-year, on-campus bachelor degree in nursing. The curricula of nurses in blended learning are based on both theoretical courses and practical training. While all practical training is done on campus and in hospital/primary health care, the course contents are organized and provided by the local learning management system (LMS) and various e-learning tools including, streaming, podcast, video and e-compendiums (see below).

Description of Education Programs

The two education programs are based on identical curricula and exams as well as lecturers and assessment examiner and carries 180 ECTS (European Credit Transfer and Accumulation System) credits. However, the timelines and learning tools differ. The on-campus education is a full-time study that spans three years. The learning tools were weekly auditorium lectures, textbooks, and the local LMS. The exams were traditional paper and pencil tests for both groups.

The blended learning education program is a part-time study over four years, and the lectures only take place for four weeks during each semester. Beyond the lectures, the remaining time of the semester involves self-study. The learning tools included are textbooks, LMSs, and e-compendiums. The e-compendiums constitute a major part of the blended learning tools and was developed to substitute for lectures and provide support for and complement the courses. The e-compendiums are PDF rich-media files that contain the lecture as a written text supplemented with figures, photos, animations, audio files, interactions, and a short multiple-choice test (Foss et al, 2013). In addition, highlighting of text, personal notes (including voice notes) and search functions are embedded. The audio files from the e-compendiums were made available as podcasts on iTunes U. Students were thus able to save the podcasts to their PCs or mobile devices. The podcasts were accessible as audio files only (mp3 files) and enhanced versions were available that also included the graphics of the e-compendiums (Foss et al. 2013).

Methodology

The study had a descriptive quantitative design. The data was collected from the exam database of the Faculty of Social Sciences.

Samples

The study included all nursing students enrolled in 2009 and 2010 attending the three-year on-campus program (OCP) or the four-year blended learning program (BLP) (Table 1). In 2009 and 2010, 16 students with a median age of 28, and 24 students with a median age of 35, respectively, enrolled in the BLP, whereas 198 students with a median age of 21, and 238 students with a median age of 21, respectively, enrolled in the OCP. For students who began in 2009 and who were 19-20 years old, the lowest secondary high school scores were 33.8 and 38.3 for BLP and OCP students, respectively. For students who were 21 years or older and enrolled in 2009, the lowest scores were 48.8 and 43.0 for BLP and OCP students, respectively. Among OCP students, those who enrolled in 2010 had the lowest scores of 37.7 and 41.6 for the age range of 19-20 and the 21 years old and older range, respectively. All students who applied and were qualified to the BLP were enrolled in 2010, and therefore, no lowest enter mark is registered.

Table 1: Characteristic of the sample

	BLP students		OCP students	
	2009	**2010**	**2009**	**2010**
Enrolled (n)	16	24	198	238
Age (median)	28	35	21	21
Lowest enter mark score*				
≤ 20 year**	33.8	0***	38.3	37.7
ordinary	48.8	0	43.0	41.6

* The lower secondary school enter mark.
**Applicants younger and above 21 years are subject to different admission requirements
*** All BLP students were enrolled in 2010, and no lowest enter mark was registered

Analysis

The descriptive analysis in this study consists of exam marks for theoretical subjects in the two study programs. The mark scale ranges from A to F, where A is the best score and F is a failing grade. Whereas the majority of the students passed the exam on their first attempt, some students required two or three attempts to pass. This explains why the number of students who completed the exams differed compared to the number of enrolled students (Table 4). All attempts of the exams are included in the analysis.

Results

In this study, we compared the exam results of BLP and OCP students who enrolled during the academic year 2009 and 2010. The nursing program contains ten theoretical subjects. The average marks on each of these subjects are presented in Table 2.

Table 2: Average marks on each theoretical subject for BLP and OCP

Course	**Course title**	**BLP**		**OCP**	
		2009	**2010**	**2009**	**2010**
BSN 140:	Fundamental of nursing	**C**	**C**	**D**	**D**
BSN 142:	Natural and medical science – part 1	**C**	**D**	**D**	**D**
BSN EX:	Philosophy of nursing	**C**	**C**	**na**	**na**
BSN 143:	Nursing and Social studies	**D**	**D**	**C**	**C**
BSN 240:	Nursing - acute, critical and chronic illnesses	**C**	**D**	**D**	**D**
BSN 241:	Natural and medical science – part 2	**C**	**C**	**D**	**D**
BSN 242:	Nursing - organisation and management	**C**	**C**	**C**	**C**

BSN 340:	Nursing - health promotion and user involvement	**C**	**C**	**D**	**C**
BSN 341:	Theories and Sciences in nursing	**C**	**C**	**D**	**D**
BSN BAC:	Bachelor thesis	**B**	**C**	**B**	**B**

na = not available

By converting the exam marks into numbers, in which the exam mark A corresponds to a 6, B to a 5, and so forth we found that the average score of OCP students was 3.4 for 2009 and 3.6 for 2010 students (Table 3). The BLP students of 2009 had an average mark of 4.0 and the BLP students of 2010 had an average mark of 3.7 (Table 3).

Table 3: Marks converted into numbers

Course Code	**Course title**	**BLP**		**OCP**	
		2009	**2010**	**2009**	**2010**
BSN 140	Fundamental of nursing	4.0	4.0	3.0	3.0
BSN 142	Natural and medical science – part 1	4.0	3.0	3.0	3.0
BSN EX	Philosophy of nursing	4.0	4.0	na	na
BSN 143	Nursing and Social studies	3.0	3.0	4.0	4.0
BSN 240	Nursing - acute, critical and chronic illnesses	4.0	3.0	3.0	3.0
BSN 241	Natural and medical science – part 2	4.0	4.0	3.0	3.0
BSN 242	Nursing - organisation and management	4.0	4.0	4.0	4.0
BSN 340	Nursing - health promotion and user involvement	4.0	4.0	3.0	4.0
BSN 341	Theories and Sciences in nursing	4.0	4.0	3.0	3.0
BSN BAC	Bachelor thesis	5.0	4.0	5.0	5.0
Average Mark		4.0	3.7	3.4	3.6

na = not available

Figure 1 illustrates the average exam marks of the 2009 and 2010 students for each subject and compares BLP and OCP. The results show that the average marks are identical for the two groups for one out of the nine subjects (BSN EX not included, see Table 3), whereas BLP students do better on six subjects and OCP students do better on two single subjects.

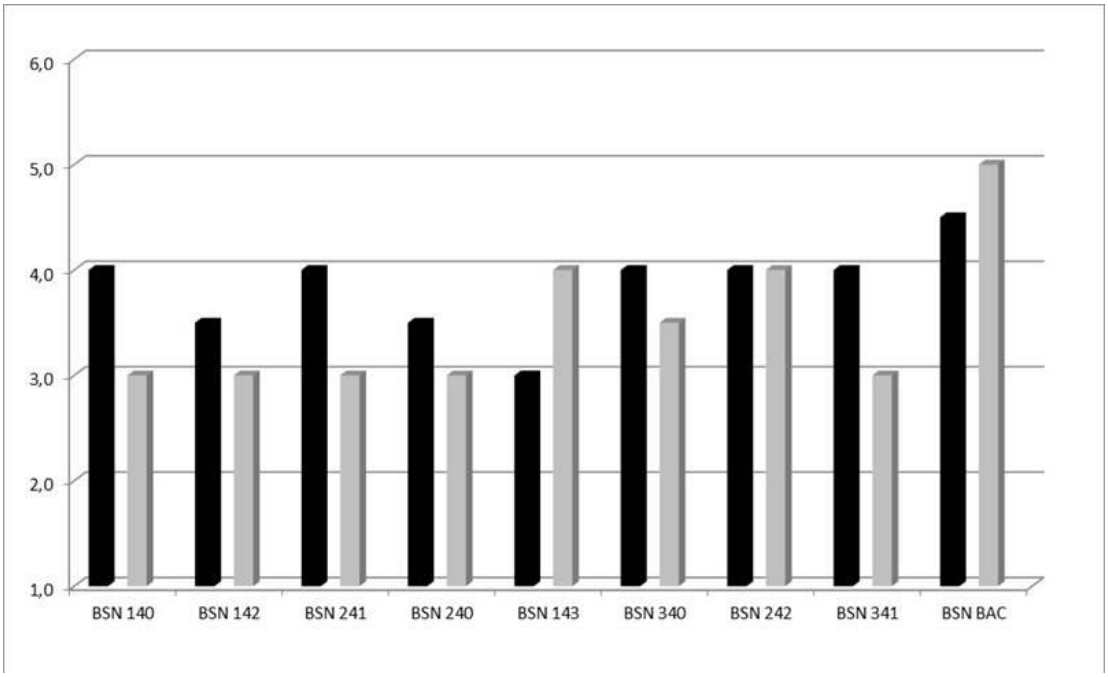

Figure 1: The average marks of 2009 and 2010 students on each subject.
Black = BLP, grey = OCP,
1 = mark F, 2 = mark E, 3 = mark D, 4 = mark C, 5 = mark B, 6 = mark A.

In addition to studying the exam marks of each subject, we also studied the failure rates of the two student groups. As presented in Table 4, the failure rates of natural and medical sciences (BSN142 and BSN241) were somewhat higher for the BLP students compared to the OCP students. The average failure rates for Natural and medical science – part 1 (BSN142) for the 2009 and 2010 students is 44.2% for BLP students and 30.0% for OCP students. For Natural and medical science – part 2 (BSN241), the same numbers were 22.5% and 17.1%, respectively. On the other hand, for the subjects BSN140, the average failure rate for OCP students was 15.8%, whereas all BLP students passed. For BSN143, the average failure rate for OCP students was 17.8%, whereas it was 20.0% for the BLP students. Thus an unambiguous pattern of failure rates was not detected among these two students groups.

Table 4: Exam failure rates (n=fail) and students attending the exams (n=total)

Course Code	Course title	BLP				OCP			
		2009		2010		2009		2010	
		n fail	n total	n fail	n total	n fail	n total	n fail	n total
BSN 140	Fundamental of nursing	0	16	0	24	27	90	42	238
BSN 142	Natural and medical science – part 1	5	16	18	36	70	201	68	259
BSN EX	Philosophy of nursing	0	14	1	21	na	na	na	na
BSN 143	Nursing and Social studies	1	11	6	24	32	204	38	189
BSN 240	Nursing - acute, critical and chronic illnesses	0	15	4	15	25	192	90	175
BSN 241	Natural and medical science – part 2	4	17	5	23	25	187	46	228
BSN 242	Nursing - organisation and management	0	13	0	15	0	163	14	183
BSN 340	Nursing – health promotion and user involvement		15	1*	15	40	148	3	191
BSN 341	Theories and Sciences in nursing	0	12	2	16	19	175	13	183
BSN BAC	Bachelor thesis	0	11	0	15	1	152	0	163

na = not available
* = Sum of BLP of 2009 and 2010.

Discussion

The aim of this study was to compare learning outcomes between students receiving blended learning and those engage in a conventional, on-campus approach. This was performed by comparing the students' exam results in the theoretical subjects for the three-year, on-campus bachelor degree in nursing (OCP), with students' exam results for the four-year, blended learning bachelor degree in nursing (BLP).

The results showed that in the nine theoretical subjects, BLP students achieved higher exam marks than OCP students on six exams, OCP students achieved higher exam marks than BLP students on two exams, and the last were equal on average. These results show that BLP students are doing at least as well as OCP students on theoretical exams in this nursing program. This is further supported by the average exam marks for BLP and OCP students thus illustrating that for BLP students who enrolled in 2009 and 2010, the average exam marks were 4.0 and 3.7, respectively, and for OCP students who enrolled in 2009 and 2010, the

average exam marks were 3.4 and 3.6, respectively. The total average of 2009 and 2010 results thus show that OCP students have a mark average of 3.5, whereas BLP students have an average mark of 3.8. Therefore, it is reasonable to assume that BLP students are doing just as well as OCP students on theoretical subjects. This result is in line with a meta-analysis study, which found that students in blended learning conditions performed modestly better than those receiving traditional, classroom-based learning models (Means et al., 2013). Another factor that supports this suggestion is our finding that there are no unambiguous patterns of differences in failure rates between BLP and OCP. Therefore, the results are probably not explained by different failure rates.

Although the curriculum exams and assessment examiner are the same, the most obvious differences between BLP and OCP are the learning methods and pedagogical tools. Whereas OCP students are closely follow up and supervised on campus and are able to interact with the lecturers, this is only the case for three or four weeks per semester for the BLP students. Thus, the BLP students are significantly more independent in their study. However, this may in fact be to their advantage. Previous reports show that one of the predictors of good exam marks is time for self-study (Schmidt et al., 2010), which is central in blended learning. In addition, the digital learning tools promote flexibility, active learning and meet the students expectations of e-learning. This is supported in a previous study (Foss et al. 2013), which found that students scored the e-compendiums as the best learning tool compared to other e-learning tools and traditional learning methods, such as lectures and textbooks. Thus, the students of the blended learning nursing program have a certain level of control over what is being lectured, and the potential disadvantage to not joining lectures are minimized. These reflections are further supported in several studies that have suggested that students who value being empowered and control their learning process prefer blended learning (Osguthorpe & Graham, 2003; Windle, McCormick, Dandrea, & Wharrad, 2011).

In addition, at least a subset of the BLP group, and maybe a majority, are older students who may be more dedicated to their studies. Based on our data we found that the secondary lower marks are higher for 2009 BLP students aged 21 years or older (48.8) than for 2009 OCP students (43.0). Unfortunately, the results from BLP enrolled in 2010 were not available due to the fact that all applicants were enrolled. Thus, we do not see the complete picture here. Yet, based on the available data, a possible interpretation may be that BLP students are older and do better on secondary education levels and are therefore better prepared for higher education. Furthermore, it may be suggested that blended learning offers pedagogical style and structure that fits older students who are in need of flexibility and convenience in order to balance their studies with other tasks and obligations in their lives. These reflections are in accordance with previous research that has highlighted that students prefer educational tools and structure that promotes flexibility (Korhonen & Lammintakanen, 2005; Rovai & Jordan, 2004). However, obviously, more research is needed to clarify what determines high exam results among BLP and OCP students in nursing education.

Methodological limitations

Some methodological limitations of the study should be acknowledged. Firstly, the number of students in the blended learning program are fewer compared to the number of students in the on-campus program. Consequently, the difference in sample sizes of these two groups limits the possibilities for generalizing our study findings. Second, our data from a single university population may mirror the institutional features in the study results. Therefore, the generalization of the findings must be interpreted with caution. Thirdly, the exam results of the OCP might include students that were not enrolled the year they are categorized in this study, as some students are taking an accounting exam during the year after the program. This is specific to the OCP student. Yet, these students most likely do better than students taking the exam for the first time. We therefore argue that the exam results of our OCP are not better than what is presented in our tables.

Conclusion

In this study, we compared the exam results of theoretical subjects in our nursing education program between students in a blended learning program and students in an on-campus program. The overall results indicated that students in a blended learning program do as well or better than the students in the on-campus program on their exams. We therefore assume, based on theoretical subjects that students in a blended learning program are just as capable of doing well in our nursing education program as students in an on-campus program. Consequently, we recommend that higher education might consider using blended learning more systematically in nursing education. However, further research should focus on larger sample sizes and additional outcome measures combined with other methodological approaches in order to explore the impact of blended learning more deeply.

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